Methodology
Lesson 2: Reading a scientific paper

Carlos Ramisch
first.last@lis-lab.fr

M2 IAAA - based on the course *Zen Research*
By Carlos Ramisch and Manon Scholivet

Outline

Articles are not perfect

- Scientific processes (e.g. reviewing) should prevent false claims
- Processes are rigorous but not perfect
- Published articles may have methodological issues and biases

  $\longrightarrow$ Even famous papers by top labs cited by everyone!

Critical reading

- Try to identify potential biases
- Discuss with colleagues if something looks "strange"
  - → If you do not understand, maybe it is unclear
  - → Convoluted language may hide obscure methodology
  - → Don't be afraid of looking silly – questions make you progress
  - → Ask the authors for questions, data, code
- Publish or perish
  - → Reviewers under pressure may overlook serious issues

Critical reading: warm-up

Ganley, Mingle, Ryan, Ryan, Vasilyeva, Perry (2013). *An examination of stereotype threat effects on girls' mathematics performance*

- Method: same maths test given to boys and girls
- Condition 1: before starting, we say *"Boys have done much better than girls on this test in the past"*

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- Condition 2: before starting, we say nothing

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- Condition 2: before starting, we say nothing
  - No stereotype $\rightarrow$ girls performed **worse**

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- Condition 1: before starting, we say *"Boys have done much better than girls on this test in the past"*
  - Stereotype → girls performed **worse**
- Condition 2: before starting, we say nothing
  - No stereotype → girls performed **worse**

Conclusion

[. . .] no evidence that the mathematics performance of school-age girls was impacted by stereotype [...]

Wooclap

Wooclap time!

Critical reading: warm-up answer

- Problem: stereotype is present even when we say nothing
  - → Condition 1: strengthen the stereotype
  - → Condition 2: stereotype is present "by default"
- **Stereotype threat**: performance is affected by stereotype
  - → And not the opposite!
- What works to mitigate stereotype threat:
  - → Before starting, we say *"In the past, we observed no difference between the performance of boys and girls on this test"*

Warning!

Conformity bias

- Everyone wants to belong to a group
  - → Do what everyone else in the community has always done
- E.g. insist on using problematic benchmarks to be comparable
  - → BLEU for machine translation,. . .

Source: Image from `https://www.youtube.com/watch?v=h9McrEaovuM`

Outline

Critical reading: hands-on activity

- Goal: train our critical reading skills
- How: you will read a "scientific" article with issues
  - → 1. Identify the issues within the article
  - → 2. Suggest what should have been done instead
- You can work in groups (max. 2 people) or alone
- Be as succinct as possible
- Write it yourself (i.e. no chatGPT)

Example:

Line	**Issue**	**How to fix?**
L. 235	Table 3 is redundant with Figure 2	Remove Figure 2
...	...	...

Evaluation criteria

- Precision :

$$\frac{\text{nb. correctly predicted issues}}{\text{nb. of predicted issues (in your report)}}$$

- Recall :

$$\frac{\text{nb. correctly identified issues}}{\text{nb. of issues to identify (in the article)}}$$

Evaluation criteria

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Dixit-style penalties

Everyone guesses vs. no-one guesses $\Longrightarrow$ no copy-paste

Ask yourself. . .

- Research question and hypotheses clearly stated?
- Work well motivated / contextualised with relevant references?
- Experiments and results consistent with research question?
- Method well described, missing details, reproducible?
- Results easy to visualise, understand and interpret?
- Conclusions in line with the results?
- Paper contains paradox, over-generalisation, subjectivity, etc.?
- . . .

Thanks!

That's all for today

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Sources

- Adeline Paiement's course materials *Initiation à la recherche*
- Ganley et al. example: "Gender inequalities" course by Isabelle Régner and Magali Putero
- Feedback from participants of previous course editions
- Slides written with the help of: ChatGPT, Google Bard, DeepL, Linguee, Overleaf
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